Clinical and Experimental Health Sciences

Validity and Reliability of the Exercise Health Belief Model Scale

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ABSTRACT

Objective: The aim of this study was to investigate the validity and reliability of the Turkish version of the Exercise Health Belief Model Scale (EHBMS).

Methods: This methodological study was conducted in 2018-2019 academic year with students from two universities located in east and west provinces of Turkey (n= 743). The sociodemographic data and those from the EHBM scale were collected. This five-point likert-type scale consists of 32 items and five factors. Construct and content validities were used to evaluate the validity of the scale, and its reliability was investigated with item-total correlation, internal consistency and test-retest method.

Results: The content validity index (CVI) of the scale was 0.98. While the Cronbach Alpha coefficient of the scale was 0.87, the alpha values of the factors were as following: 0.87 for general health value, 0.76 for beliefs about the vulnerability of not exercising, 0.87 for beliefs about the severity of not exercising, 0.87 for beliefs that exercising can reduce threats, and 0.77 for beliefs that the benefits exceed the costs of exercising. The test-retest correlation value was 0.88 ($p<0.05$) for the whole scale. The model fit indices of the five-factor structure of the scale were found to be good.

Conclusion: The Turkish version of the Exercise Health Belief Model Scale was found to be a valid and reliable scale.

Keywords: Exercise, Health Belief Model, Reliability, Scale, Validity

1.INTRODUCTION

Modern technology has dramatically reduced the habits of people to move. Cars have reduced our need to walk, and machines that do heavy work for us have taken their place in daily life. In addition, devices such as televisions and computers cause us to remain inactive for long periods of time. Research shows that even the most inactive people can gain significant health benefits when they perform light exercises, such as short walks, on a regular basis (1). Exercise programs planned on scientific basis have become a necessity of our daily life (2).

Although the positive effects of physical activity and exercise on health are widely known, the physical activity level of the majority of people worldwide is low (3). According to the latest data from the World Health Organization (WHO), one in four adults (1.4 billion people) worldwide does not follow physical activity recommendations that reduce common chronic diseases and increase health and well-being (4). Physical activity is an important indicator of a healthy life. Considering the clinical, psychological and social benefits, physical activity is found to be the most important factor contributing to healthy aging (5). In line with both the physiological and psychological benefits of physical activity, encouraging participation in physical activity is amongst the priorities of promoting public health in many developed countries (6).

Health behaviors include all actions related to health protection and health promotion. Many theories and models related to behavior change have been developed (7) and using these models plays an important role in nursing as these models guide health behaviors and indicate possible interventions that might be needed (8, 9). Since the early 1950s, the Health Belief Model (HBM) is one of the most widely used models in health-related behavior research, both to explain the change and maintenance of health-related behaviors and as a guiding framework for initiatives towards health behavior (10). The model explains the indicators of the use of preventive health behaviors (11, 12). According to this model, the individual's desire to participate in physical

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activities depends on his/her perception of how beneficial or harmful his/her current health behavior is (13, 14).

In addition to being very beneficial for the health of young people, physical activity in this population becomes a habit and leads to long-term benefits. On the larger scale, it positively influences both the individual and the community health. Therefore, assessment of the persistence level of physical activity in different stages of life is useful for planning future interventions (15). In programs aiming to increase physical activity in adults, using a valid and reliable health belief model scale will be useful in planning, evaluating, and implementing effective programs.

In this regard, there is no measurement tool based on health belief model in Turkey. Hence, the aim of the present study is to translate and adapt the Exercise Health Belief Model Scale (EHBMS) developed by Esparza et al. (2017) into Turkish and to investigate its reliability and validity.

2. METHODS

This methodological study was conducted with 743 undergraduate students from two universities in 2019. Inclusion criteria were being a university student and volunteering to participate and exclusion criteria were not wanting to participate in the study and filling in the data collection forms incompletely.

2.1. Data Collection

Using self-report method, all the data were collected using descriptive information form and EHBMS. The test was repeated 4 weeks later with 100 students. *Descriptive information form*s were created by the researcher, this form consists of 11 questions regarding age, gender, place of residence, financial status, health status, place of residence of the family, etc.

2.1.1. Exercise Health Belief Model Scale (EHBMS):

Developed by Esparza et al. (2017), this 5-point Likert-type scale consists of 32 items. For items 1 to 26, the response options are as following: “1. Not at all”, “2. A little”, “3. More or less”, “4. Quite a bit”, and “5. A lot”. For items 27 to 32, the response options are: “1. I don’t believe”, “2. Maybe, but it’s unlikely”, “3. I believe it’s likely”, “4. I believe it’s very likely”, and “5. I believe, I’m sure of it”. The scale consists of 5 factors and there is no reverse item. The highest and lowest score on the scale is 160 and 32, respectively. Higher scores indicate higher level of exercise health belief (16).

Cronbach Alpha coefficients of the five factors in the original scale are as following: 0.84 for general health value, 0.67 for beliefs about the vulnerability of not exercising, 0.90 for beliefs about the severity of not exercising, 0.85 for beliefs that exercising can reduce threats, and 0.75 for beliefs that the benefits exceed the costs of exercising.

2.2.Translation Process

As the first step, a linguist and a professor with good command of English translated the original scale from English to Turkish. The translation was reviewed and edited by the researchers, and the Turkish version of the scale was translated back to English by two different linguists (17). The back-translated scale was sent to the developer, Esparza, for evaluation and compliance approval.

2.3. Validity and Reliability

The validity of the scale was tested in terms of construct and content validity. After the translation, ten academician nurses were asked for their opinions regarding scale validity. Both qualitative and quantitative data were obtained from the experts. Quantitatively, the experts were asked to evaluate and score the relevance and intelligibility of each scale item on a range of 1 to 4. Qualitatively, they were asked to submit their written opinions about the scale items. Construct validity was assessed using confirmatory factor analysis. The reliability of the scale was tested using internal consistency, item-total correlation and time invariance methods.

2.4. Data Analyze

SPSS Statistics 22.0 and Lisrel 8.80 programs were used to analyze the data. Descriptive statistics were used to analyze sample characteristics. Content validity of the scale was assessed using the Content Validity Index (CVI) as proposed by Lynn (1986) (18).

CVI was calculated for each of the scale items as well as the whole scale. For each item, the CVI was calculated by dividing the number of the experts who scored the item as 3 or 4 to the total number of the experts. The arithmetic mean of CVIs of all items was recorded as the CVI of the entire scale. Test-retest reliability was examined using Pearson correlation analysis. Internal consistency was evaluated using Pearson correlation (item-total correlation) and Cronbach α. Confirmatory factor analysis was performed for construct validity. Multiple confirmatory indices were used for Confirmatory Factor Analysis. Fit indices >.95 for Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Non-Normed Fit Index (NNFI) and Root Mean Square Residual (RMR); and fit indices <.05 for Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) indicate perfect fit. However, for the RMSEA and SRMR, <.08 indicates good fit. Furthermore, although x2/df value is preferred to be ≤ 2, the model is still considered acceptable if this value is less than 5 (19, 20).

2.5. Strengths and Weaknesses of the Research

This scale is a scale developed based on health belief model. Adaptation to Turkish is the strength of this study.

3. RESULTS

79.8% of the students participated in the study were females, 51% were residing in dormitories, 84.9% had moderate financial status, 75.5% had no sports facilities in their university, 58.7% had no access to suitable areas to do sports in their neighborhood, 71.3% were coming from families with no major interest in sports, 88.3% had no illnesses, 50.5% were in good health, and 42.5% were living in city centers (Table 1).

Table 1. *Sociodemographic characteristics of the participants*

		n	%
Gender			
	Male	150	20.2
	Female	593	79.8
Place of Residence			
	With Family	268	36.1
	Student House	96	12.9
	Dormitory	379	51
Financial Status			
	Low	89	12
	Moderate	631	84.9
	High	23	3.1
Are there any sports facilities in your university?			
	Yes	182	24.5
	No	561	75.5
In your neighborhood, are there any areas where you can do sports?			
	Yes	307	41.3
	No	436	58.7
Are any of your family members interested in sports?			
	Yes	213	28.7
	No	530	71.3
Do you have any illnesses?			
	Yes	87	11.7
	No	656	88.3
Health Status			
	Good	375	50.5
	Moderate Poor	360 8	48.5 1
Family Place of Residence			
	City Center	316	42.5
	Suburbs	282	38
	Countryside	34	4.6
	Village	111	14.9

0.87 for general health value, 0.76 for beliefs about the vulnerability of not exercising, 0.87 for beliefs about the severity of not exercising, 0.87 for beliefs that exercising can reduce threats, and 0.77 for beliefs that the benefits exceed the costs of exercising.

3.1. Reliability

The Cronbach Alpha coefficient was found to be 0.87 for the entire scale. Cronbach Alpha coefficients of the five factors of the scale were as following: 0.87 for general health value, 0.76 for beliefs about the vulnerability of not exercising, 0.87 for beliefs about the severity of not exercising, 0.87 for beliefs that exercising can reduce threats, and 0.77 for beliefs that the benefits exceed the costs of exercising. The factors of the scale items and item-total score correlations were between 0.23-0.88 and were statistically significant (p<.001) (Table 2). The test-retest reliability correlation value of EHBMS was found to be 0.88.

3.2. Validity

Content validity; considering the experts' opinions regarding the relevance and intelligibility of the scale items, the CVI of the items was found to be between 0.90 and 1, and the CVI of the entire scale was 98%.

Construct validity; was assessed using confirmatory factor analysis. The result of confirmatory factor analysis revealed that although chi-square value (x2 = 2577.21, df = 454, p = .00) was significant, chi-square/degree of freedom (x2/df = 5.6) was higher than expected. Goodness of fit values were CFI = .93; NNFI = .93; SRMR = .066; and RMSEA = .079 (Table 3) (21).

Table 3. *Confirmatory factor analysis fit indices*

Fit Indices	Definition *	Results
X2 / Degree of Freedom	Below 5 = moderate fit Below 3 = perfect fit	2577.21/ 454=5.6
P value	P<.05 = no fit p>.05 = perfect fit	0.000
Goodness of Fit Index (GFI)	Above .90 = good fit Above .95 = perfect fit	0.82
Adjusted Goodness of Fit Index (AGFI)	Above .90 = good fit Above .95 = perfect fit	0.79
Comparative Fit Index (CFI)	Above .90 = good fit Above .95 = perfect fit	0.93
Non-Normed Fit Index (NNFI)	Above .90 = good fit Above .95 = perfect fit	0.93
Root Mean Square Residual (RMR)	Below .10 = weak fit Below .08 = good fit Below .05 = perfect fit	0.058
Standardized Root Mean Square Residual (SRMR)	Below .10 = weak fit Below .08 = good fit Below .05 = perfect fit	0.066
Root Mean Square Error of Approximation (RMSEA)	Below .10 = weak fit Below .08 = good fit Below .05 = perfect fit	0.079

Table 2. *Psychometric properties of exercise health belief model scale*

Sub-scales	Scale Items	X	Ss	r	r_1	CFL	α
General health value	1. How much are you interested in your health?	3.50	0.90	0.30	0.75	78	
	2. How much do you think about your health?	3.65	0.92	0.29	0.83	88	.87
	3. How much do you care about your health?	3.81	0.96	0.32	0.80	80	
	4. How much important do you think it is to pay attention to your health?	4.25	0.90	0.30	0.54	48	
Beliefs about the vulnerability of not exercising	5. How much serious is it to suffer from high blood pressure?	4.55	0.76	0.37	0.54	40	
	6. How much serious is it to have diabetes?	4.61	0.73	0.42	0.66	47	
	7. How much serious is it to suffer heart attack?	4.79	0.58	0.43	0.68	47	.76
	8. How much serious is it to suffer heart a stroke?	4.83	0.55	0.48	0.66	48	
	9. How much serious is it to get cancer?	4.79	0.60	0.42	0.56	43	
	10. How much serious is it to get weight?	3.75	1.04	0.31	0.22	23	
Beliefs about the severity of not exercising	11. How much do you think exercise will help you to prevent being a patient with high blood pressure?	4.13	0.87	0.45	0.55	49	
	12. How much do you think exercise will help to prevent (or control) diabetes?	4.04	0.90	0.50	0.60	54	
	13. How much exercise do you think will help to prevent heart attack?	4.24	0.84	0.53	0.65	56	
	14. How much exercise do you think will help to prevent strokes?	4.02	0.96	0.39	0.52	51	
	15. How much exercise do you think will help to prevent cancer?	3.81	1.09	0.47	0.60	64	.87
	16. How much exercise do you think will help to prevent gaining weight	4.46	0.83	0.52	0.59	56	
	17. How much do you think exercise will help you to have better health?	4.48	0.78	0.63	0.68	62	
	18. How much exercise do you think will help to have a better quality of life	4.43	0.83	0.63	0.65	64	
	19. How much do you think exercise will help to live longer?	4.17	0.97	0.51	0.55	65	
	20. How much do you think exercise will help to appear better?	4.29	0.91	0.59	0.53	61	
Beliefs that exercising can reduce threats	21. Is it worth [to spend time and to deal with laziness] to make efforts to exercise to prevent diseases in the future?	4.23	0.83	0.60	0.65	61	
	22. Is it worth the to make effort [to spend time and dealing with laziness] to exercise for a better health?	4.30	0.83	0.61	0.71	67	
	23. Is it worth the to make effort [to spend time and to deal with laziness] to exercise for a better quality of life?	4.29	0.81	0.64	0.76	69	.87
	24. Is it worth the to make effort [to spend time and to deal with laziness] to exercise to live longer??	4.02	1.00	0.54	0.71	76	
	25. Is it worth the to make effort [to spend time and dealing with sloth] to try to appear better?	4.14	0.93	0.54	0.65	66	
	26. Even if exercising is difficult, it is worth doing to prevent diseases in the future.	4.26	0.88	0.51	0.61	58	
Beliefs that the benefits exceed the costs of exercising	27. Do you think you can be a high blood pressure?	2.53	0.98	0.17	0.58	77	
	28. Do you think you can be a diabetes?	2.63	1.03	0.24	0.64	85	
	29. Do you think you can have a heart attack?	2.84	1.05	0.15	0.57	65	.77
	30. Do you think you can have a stroke?	2.51	1.01	0.17	0.58	64	
	31. Do you think you might have cancer?	2.74	1.13	0.14	0.56	64	
	32. Do you think you can get weight?	3.22	1.27	0.22	0.27	38	

X = Mean ; Ss = Standart Deviation; CFL = Confirmatory Factor Loadings; α = Cronbach's Alpha, r = Item Total Scale Score Correlation; r_1= Item Sub-Scale Score Correlation

4. DISCUSSION

According to this study, it can be concluded that the Turkish version of the Exercise Health Belief Model Scale is an appropriate, valid and reliable scale for adults. The first step of scale adaptation studies in different cultures is the translation of the scale from the original language to the target language (22). In the present study, the back-translation of the Turkish version of EHBMS was sent to the developer of the scale, Esparza, who evaluated and approved the translated scale.

Reliability, which is one of the essential characteristics of any scale, expresses the accuracy, consistency and stability of the scale. This feature indicates that the tool collects data correctly and is repeatable (23-25). The reliability of the data collection tool can be tested via considering its invariance with respect to time, its compatibility between independent observers and its internal consistency (24, 26).

Internal consistency is the reliability that determines whether all aspects of the scale are capable of measuring the desired parameter. Cronbach alpha coefficient less than 0.40 indicates that the scale is not reliable, 0.40≤ α <0.60 indicates low reliability, 0.60≤ α <0.80 indicates fair reliability, and 0.80≤ α <1.00 indicates high reliability (24, 25-27).

Cronbach Alpha coefficient of the original scale was similar to that of the translated version of scale.

The test-retest method is performed to ensure consistent results in repeated measurements at regular intervals and to evaluate the scale's invariance over time (28).

In the present study, the test-retest correlation value was 0.88 (p <0.05), indicating that there was a strong correlation between the two measurements at different times and that the scale was invariance over time.

Validity determines the degree to which a measuring instrument measures ''what'', ''how much'', and "how accurately" (24). Although there are different methods to evaluate the validity of a scale, content validity and factor analysis are among the most commonly used methods (29).

Content validity is used to evaluate to what extent the scale and each item in the scale measure the target correctly. Any CVI value above 0.80 ensures the content validity of the scale (24, 30). According to this study, the CVI of EHBMS was 0.98 indicating that the content validity criterion was met and was consistent with the literature (24, 30-32).

The construct validity evaluates the extent to which the tool fulfills its purpose in measuring the target, and the extent to which it can accurately perform the measurement (19, 24). The most commonly used method for construct validity is factor analysis (24). which is a statistical technique to assess whether all items in the scale can be collected under different subscales (24). Factor analysis can be performed in two different methods: Explanatory factor analysis, which is recommended for scale development studies, and confirmatory factor analysis, which is recommended for scale translation/adaptation studies (33). Confirmatory factor analysis was performed in this study.

"Goodness of fit statistics" performed in confirmatory factor analysis should be at desired levels (24). It is also recommended that the loads between the subscales and the items should be at least 30 and above. In our study, it was found that the loads between the items and their subscales were above 30 except for the items 10 and 32. Eliminating these two items did not cause any change in the goodness of fit indices and Cronbach Alpha values of the scale. Since it is recommended that items that do not change reliability and support the scale should not be excluded from the scale (34), these two items were preserved in the translated version.

Confirmatory factor analysis of the Turkish version of EHBMS was compared with the five-factor model of the original scale, and the chi-square value ($x^2 = 2577.21$, df = 454, p = .00) was found to be significant; yet the chi-square/degree of freedom (x^2/df) was found to be 5.6. Although x^2/df value is preferred to be ≤ 2, the model is considered acceptable in cases where this value is less than 5 (19, 33, 35). The literature reports that chi-square value increases as the sample size increases (19). So, it can be said that the high chi-square value of the current study was due to the sample size (n = 743). Other goodness of fit values were: CFI = .93; NNFI = .93; SRMR = .66; and RMSEA = .79. Based on these results, goodness of fit values confirmed that the scale validates five different factors at an acceptable level.

5. CONCLUSION

The validity and reliability of the Turkish version of the Exercise Health Belief Model Scale are quite good. The scale can be used to evaluate exercise-oriented health beliefs and behaviors in Turkish-speaking adults.

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